

CHARACTER OF BARKBEETLE LOSSES.

by
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Barkbeetles at times cause undue losses in coniferous forests, especially in the western United States. These insects, *which* belong~~ing~~ to the family, Scolytidae, attack the cambium tissue of living trees, or those recently felled or windblown. The more important species belong to the Genus *Dendroctonus*. Practically all species of coniferous trees are subject to the attacks of insects of this group but the heaviest economic losses are sustained in the soft pines such as, western yellow pine, western white pine, sugar pine and lodgepole pine.

The barkbeetles of the United States are all native. The problem of their control differs in many aspects from that of pests attacking cultivated crops or pests like the Gypsy Moth which have gained a foothold through introduction. Barkbeetles are distributed to a greater or less extent everywhere throughout the range of their native host trees. Habits have been acquired and adaptations made whereby the indefinite perpetuation of the host tree and its insect enemies is possible. Under virgin forest conditions the *Dendroctonus* beetles may maintain themselves for long periods by breeding in the natural wreckage of the forest caused by storms, lightning and similar agencies, and the occasional killing of normal and healthy trees. Under these conditions the stand is not depleted as the loss is less than the annual increment from growth. But at irregular intervals, the number

of normal trees killed may increase, and a large volume of standing timber will be destroyed over large areas. Usually within a few years these outbreaks subside through natural agencies of control. The resultant losses may vary anywhere from two percent to more than fifty percent of the stand. It is usually the middle-aged and mature trees of the forest that are killed, ^{leaving} ~~and~~ the reproduction ~~is left~~. As a result the resources are left intact for rapid restocking of the devastated areas.

At present the natural factors which govern the increase and decrease of epidemics are inadequately understood either by the Entomologist or the Forester. It is realized that barkbeetle epidemics may ^{because lowered vitality of the trees weakens their resistance to attack.} develop ~~due to lack of resistance in the trees.~~ This condition may arise from drought, unusual weather, or soil conditions. On the other hand failure of natural enemies such as insects, birds, or disease to maintain control may initiate a barkbeetle epidemic. These points can only be determined through research and when the underlying factors are fully uncovered, they will undoubtedly be recognized in the management of forest lands. The ultimate object of forest entomology is to prevent losses by the handling of forests so as to avoid the ^{pl} conditions which favor and breed up insect epidemics.

Methods of Control:

Until silvicultural methods of controlling barkbeetle losses have been developed, direct control of barkbeetle outbreaks is the only feasible means of protecting the present forests of mature merchantable timber. From the standpoint of the timber owner who desires to protect his present holdings until the timber can be marketed, the use of these

methods is fully warranted. It has been demonstrated that with one or two season's application the reduction in losses fully offsets the cost of the work.

The methods used are based upon the habits of these insects and take advantage of one weak point in their life history. Instead of being lightly distributed on ^{the} all trees throughout the forest, they concentrate in certain trees. ^{in order to kill them.} The broods of beetles are ~~still further~~ ^{found only} ~~concentrated~~ in the cambium tissue and bark of these trees. The ~~major~~ ^{essential} ~~feature~~ ^{part} of control consists in locating these infested trees and destroying or exposing the infested bark before the broods develop and emerge.

The key to successful control work consists in locating the infested trees. This work, known as spotting or cruising, requires especial training. Infested trees are distinguished by the color of the foliage, or the pitch exudations or sawdust berings where the beetles entered through the bark. The subsequent work of falling, limbing, peeling and burning of the infested tree can be carried on by ordinary labor accustomed to woods work.

In large projects especially organized camps of from 12 to 25 men are required. As a rule, burning of the infested bark along side the log is universally employed. This scorches the log but does not destroy it, and timber so treated can be utilized if salvaged within one or two years. Eventually the various wood fungi render it more or less unmerchantable. On large projects the cost varies from \$3.50 to \$7.00 per thousand board feet.

Where logging operations can be employed, less direct measures of control can be utilized in this sort of work. Removing infested logs

~~from the infested areas~~ to ~~the~~ regions outside of the forest, or submergence of logs in water for a month or more will accomplish a certain reduction in infestation.

Engraver Beetles:

One phase of barkbeetle damage is caused by a group of insects known as engraver beetles. The majority of the species in this group belong to the Genus Ips. These insects attack by preference trees which have been recently felled, the tops, limbs and cull logs left in logging operations, windfalls, etc. Where these beetles have multiplied to such an extent that there is not enough down material available for them, they will attack the tops of large trees and kill entirely small trees in reproduction and pole stands. These outbreaks are quite sporadic in character and are brought under control by natural agencies within a season or two. Special control measures are warranted only occasionally.

Where cutting has been going on for a season or two and is then discontinued, conditions arise which may result in attacks on living trees, as no fresh slash material will be available. It is best under such circumstances to burn any slash material which is infested with engraver beetles as a means of preventing attacks in surrounding green timber.

WESTERN YELLOW PINE:

Western Pine Beetle-

Description and Life History:

A small black cylindrical beetle less than one fourth of an inch in length; parent adults, and small to full grown larvae overwinter in the trees attacked preceding fall; new adults from these broods begin emerging the latter part of April in the warmer regions and continue until June; emergence is correspondingly later in colder regions; attack on new trees is initiated by the parent adults in June by entering through the bark and extending small winding tunnels through the cambium between bark and wood; eggs are deposited on sides of gallery and hatch within a week; larvae feed in cambium and later enter the outer bark where they pupate and transform to new adults. During the summer this life cycle requires about sixty days and the new adults emerge and attack new trees during the fall in which they overwinter.

Control:

During winter and spring months select infested trees with overwintering broods: fell, peel and burn infested bark.

Control can be applied to summer brood trees by ^{either} burning or exposing bark to direct sunlight.

WESTERN YELLOW PINE

Black Hills Beetle-

Description and Life History:

A small cylindrical black beetle about one fourth of an inch in length. Overwinters principally as larvae in the inner bark of trees attacked previous summer and fall: new adults from overwintering larvae begin to form in June: emergence starts around the first of August and continues until October: attack on new trees continues from the last of July to October: egg galleries are long, nearly straight and longitudinal and follow grain of the sapwood: larval mines are extended at right angles to egg galleries: pupal cells are found in inner bark next to sapwood. There is one generation annually.

Control:

Fall trees during winter and spring period and peel bark so as to expose broods to the weather.

WESTERN YELLOW PINE - *Western White Pine - Sugar Pine - Lodgepole Pine.*

Mountain Pine Beetle-

Description and Life History:

A small cylindrical black beetle about one fourth of an inch in length, somewhat larger than the western pine beetle. Broods overwinter in all stages in trees attacked the previous winter; new adults emerge from June to August; attack on new trees begins in July and continues for remainder of season; egg galleries are about 16 inches in length and extended vertically in cambium following grain of sapwood; egg incubate within a week and larvae extend feeding galleries at right angles to egg galleries - pupae cells are formed in inner bark next to the sapwood; new adults usually do not emerge until the following spring after. One generation annually is the rule but in the southern limits of its range, two may occur.

Control:

Cut and peel infested trees during winter and spring months; providing no new adults have formed, peeling and exposure to weather is sufficient to kill broods; burning is advisable, however, after new adults form.

The mountain pine beetle also attacks western white pine, sugar pine and lodgepole pine. Its life history, habits and control are essentially the same as in yellow pine.

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